

Nov. 1875

REPORT

OF THE

BOARD OF COMMISSIONERS

OF THE

SECOND GEOLOGICAL SURVEY OF PENNSYLVANIA;

FOR 1873.

To the Honorable the Senate and House of Representatives of Pennsylvania:

The Board of Commissioners of the Second Geological Survey of Pennsylvania respectfully present the following Report:

The plan of the Survey recommended by the State Geologist and adopted by the Commission without material modification, was, in a few words, to devote the greatest attention first to those portions of the State, which had been less thoroughly explored by the former Survey; to put as many parties in the field, as the limited appropriation would permit; to do the work thoroughly; and to publish the results at once.

It was evident that the appropriation of thirty-five thousand (35,000) dollars per annum for three years would not suffice to make a complete Survey of the State, and therefore, the work had to be restricted to the most important districts.

The Survey began with five parties in the field, and two in the laboratory. One party beginning at Easton was to sweep

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through the great valley from the Delaware to the Potomac. A second had charge of the triangle bounded by the Susquehanna, the South Mountain and the Maryland line. This district, the counties of York and Adams, had scarcely been touched by the former Survey, and its great treasures of mineral wealth were almost unknown to science. The third party began work in the Lewistown valley, with instructions to cover the Fossil-ore outcrops, and also the Broad Top coal-field. The district allotted to this party extends in breadth from the Tuscarora mountain to the Alleghanies, and in length from beyond the west branch of the Susquehanna to the southern boundary of the State, the various outcrops of the fossil veins extending nearly one thousand miles in length. The fourth party had charge of the Appalachian Coal-field, commencing in Centre and Clearfield counties, and working westwardly and south-westwardly into Jefferson, Cambria, Somerset and Westmoreland counties. This portion of the State was hardly explored at all by the former Survey, and its immense scientific and commercial importance demanded all the time and means which could be given. The fifth and last party was assigned to the oil region in the north-western part of the State. All these parties collected specimens which were forwarded to the rooms of the Survey at Harrisburg, and such of them as required it, were analyzed by the chemist of the Survey.

Such was the organization of the first year. The winter was employed by the different parties in preparing maps and sections and writing up their reports. Two of these Reports were published in the spring, and others have been issued since; the remainder are either in press or are ready for the printer. Their titles and descriptions are as follows :

A. First Annual Report of Progress, preceded by a History of Geological Exploration in Pennsylvania, by J. P. Lesley, State Geologist (to be issued in January, 1876).

B. Preliminary Report on the Mineralogy of Pennsylvania,

by F. A. Genth, Mineralogist of Survey, with an Appendix on Hydrocarbons, by S. P. Sadtler.

C. Report of Progress in York and Adams counties, with Maps and Illustrations, by Persifor Frazer, Jr., Assistant Geologist (to be issued in February, 1876).

D. Report of Progress on the Brown Hematite Ore Ranges of Lehigh county, with Maps and Illustrations, by Frederick Prime, Jr., Assistant Geologist.

H. Report of Progress in the Clearfield and Jefferson districts of the Bituminous Coal-fields of Western Pennsylvania, with Maps and Illustrations, by Franklin Platt, Assistant Geologist (to be issued in January, 1876).

I. Report of Progress in the Venango county district, with Maps and Illustrations, by John F. Carll, Assistant Geologist in charge of the Oil Regions; with notes on Geology around Warren, by F. A. Randall, and Notes on Comparative Geology of North-eastern Ohio, North-western Pennsylvania, and Western New York, by J. P. Lesley.

J. Special Report on the Production, Transportation, Manufacture, and Statistics of Petroleum of Pennsylvania, with Maps and Illustrations, by Henry E. Wrigley, with a Map and Profile through Butler, Armstrong, and Clarion counties, by D. Jones Lucas—and a Map and Profile along Slippery Rock Creek, by J. P. Lesley.

L. Special Report on the Coke Manufacture, with geological notes on the Coal and Iron-ore beds of the Youghiogheny Valley, by Franklin Platt, from surveys by Chas. A. Young, with a Report on Methods of Coking, by John Fulton.

M. Report of Progress in the Laboratory of the Survey at Harrisburg, by Andrew S. McCreath, Chemical Assistant.

It is believed that so speedy a publication of results of work in the field is without parallel in the history of Geological Surveys.

At the close of 1874 your Commission found that a con-

siderable surplus was left from the appropriation for that year. This arose partly from the shortness of the time which was left for field work after the organization of the Survey (in July), and partly from the reservation of a fund to pay for publication of the Reports. At the close of the year, however, a decision was given by the Attorney General, to the effect that the act relating to Public Printing applied, under the provisions of the new Constitution, to the Geological Reports, and that therefore, the work must be done by the State Printer, under his contract, and be paid for out of the appropriation for Public Printing.

With the surplus fund derived from this source the Board of Commissioners decided to provide additional field parties for 1875. Accordingly a sixth party was sent into the Northern District, embracing the counties bordering on New York, from Tioga to Pike and Wayne. A seventh party was assigned to Washington and Green counties, in the South-western corner of the State; and advantage was taken of the accidental presence of Dr. T. Sterry Hunt, to obtain a reconnoissance of the intricate and little understood trap rocks in the Central-eastern part of the State.

To keep these parties in the field during the summer, and in the office preparing maps and reports after the close of the season for field work, has completely exhausted not only the annual appropriation for the year, but also, the unexpended balance carried over from last year.

The organization this year has been most satisfactory and the work has been admirably done. But if it is carried on next year on the same scale, the appropriation for 1876 will be exhausted by the middle of September. It would require at least fifteen thousand (15,000) dollars more to provide for the balance of the year. Without such additional means it will be necessary either to disband two or more of our field parties; or to reduce the numbers of all, thereby sadly impairing their

efficiency ; or else to find ourselves without the means requisite to prepare the work of that year for publication.

At the time the Act creating the Survey was before the Legislature it was distinctly stated by the friends of the measure, that this great work could not be completed for the amount of the appropriation, nor in the time prescribed. But the Legislature wisely determined to give just enough and no more than enough for a fair trial, and to be governed, in their future action, somewhat by the results of the trial.

We have now to show what has been done, and what remains to be done.

In 1874 the work of the Survey partially covered the following areas: Southern Lehigh ; Middle York ; part of Mifflin ; Clearfield ; the west half of Centre ; nearly two-thirds of Jefferson ; Northeastern Venango and Southwestern Warren.

Contour line maps were made of the Southern part of Lehigh, the Schuylkill Water Gap, and the Fossil Ore Range along the north side of the Lewistown Valley ; the materials were collected for a contour line map of the middle belt of York county and of Eastern Venango.

Only geographical maps were made of Centre, Clearfield, and Jefferson, leaving that country to be properly mapped with contour lines at some future time.

In 1875, the work of the Survey has covered, as far as possible, the following additional areas: Southern Northampton ; Northern York, parts of Adams ; parts of Snider, Juniata, Mifflin, Huntingdon, and Blair ; Cambria and a large part of Somerset ; Greene and Washington ; Southern Allegheny, Southern Beaver, small parts of Lawrence, Mercer, Crawford, Warren, Butler, Venango, and Clarion ; Tioga and Bradford.

Contour line maps were made of the Limestone belt in Northampton ; of the Lehigh and Delaware Water Gaps ; of the Aughwick Valley and East Broad Top Coal Basin ; of Sinking Valley ; Canoe Valley ; and half of Morrison's Cove. A geo-

graphical map of Greene and Washington, up to the Ohio River, shows the depth of the principal Coal-beds.

Tioga and Bradford counties will be colored geologically to show all the outcrops; geological maps of Beaver river, Slippery Rock creek, the Butler Oil Belt, and the outcrop of the Second Mountain Sand, from the New York to the Ohio State lines, and a little map of the Renovo Coal-field have been prepared. The topographical mapping of Cambria, Somerset, Greene and Washington, up to Pittsburg, and Beaver must be left for the future.

The work of the Survey in 1876, will cover as much of the following areas as may be possible: Middle Berks, Southern Lebanon, and Dauphin; parts of York and Adams, with parts of Cumberland and Franklin; Perry and part of Juniata; Union county; parts of Blair, Huntington, and Bedford; part of Somerset, Fayette, Westmoreland, Indiana and Eastern Armstrong; parts of McKean, Forest, and Elk; parts of Butler and Clarion; parts of Lawrence, Beaver, Mercer, Susquehanna, Wayne, and Northern Luzerne.

It is expected that topographical maps can be made in 1876 of the Limestone belt, between Allentown and Harrisburg, of parts of the South Mountains, of the Broad Top Coal region, of the rest of Morrison's Cove, of Nittany Valley and perhaps Brush Valley, of the Salisbury Coal basin in Somerset county and of certain districts in the Oil region.

A geologically colored outcrop map of Susquehanna and Wayne will be prepared for publication, but topographical maps of Fayette, Westmoreland and Indiana must be left for the future.

The areas proposed to be covered in 1877 are, as far as possible, as follows: the remaining parts of Northampton, Lehigh, Berks, Lebanon, Dauphin, Cumberland, Franklin, Fulton, Bedford, Blair, Huntingdon, Northumberland, and Centre; Pike and Monroe and the residue of Luzerne and Wyoming; Sullivan,

Lycoming, Clinton, Potter and Cameron ; parts of McKean, Elk, Jefferson, Forest and Clarion ; Erie, Northern Warren, Northern Crawford, Western Armstrong, Southern Butler, Northern Allegheny and Eastern Beaver.

There would still remain such parts of the above as cannot be covered for want of time, and all Bucks, Montgomery, Philadelphia, Delaware, Chester, Lancaster, Southern Berks, and the entire Anthracite Coal region.

A resurvey of the Anthracite Coal-fields was not included in the plan of the second Survey for the first two years for several reasons, the principal of which were: 1. The fact that they had received more attention from the first Survey from 1836 to 1841, than all the rest of the State taken together, and were elaborately and exclusively resurveyed in 1851 and 1852 preparatory to the publication of the final report of 1858, so that their Geology is not only well-known, but has been admirably published; while on the contrary, the Bituminous Coal-field was scarcely known at all, and plainly demanded attention on account of its growing interests. 2. Because of the stringent demand for long and close work in the Oil Regions. 3. Because the Survey could digest and classify the great mass of data, accumulated in the Anthracite region, by its mining engineers and geologists, to far better advantage at a later date. These reasons moved the Board in adopting its plan of the Survey, and were moreover urgently pressed upon its attention by citizens of the State.

By the spring of 1879, or certainly of 1880, we should thus have prepared a very complete description of the Geology of Pennsylvania with geographical sketch maps, a few geologically colored county maps and topographical contour line maps of some of the important Ore belts, with maps and models of the Broad Top Coal region, of a few of the Water Gaps and of special localities in the Coal regions.

When the work described above is finished, it would be pos-

sible to prepare for publication an Atlas of geologically colored County Maps of the whole State.

But the work of the Survey cannot be said to be complete until topographical contour line maps of the entire Bituminous Coal region of Western Pennsylvania are provided. This work, now necessarily postponed, would require the entire instrumental force of the Survey, as at present organized, for at least two full seasons. Other parts of the State, especially the region lying South-east of the South Mountain range, need the same careful instrumental topographical mapping to make their Geology clear. There is no reliable map of the State as a whole, and the county maps are of all orders of accuracy. The cost of the work will be great, and will never repay private enterprise: it must therefore, if done at all, be done under the auspices of the State Government.

A map of the State to be entirely accurate needs, however, another kind of treatment, which is the well known business of the U. S. Coast Survey, commencing with the measurement of primary and secondary triangles and the absolute determination of a large number of fixed points. This preliminary work has already been commenced by the Coast Survey, during the last summer and will be continued from year to year until the entire area of the State has been occupied by its stations, conditionally upon the continuance of the State Survey.

The Coast Survey, *in the course of time*, will furnish the fundamental data necessary for such a map, as the plan of that work contemplates establishing at least one fixed point in every township in the State. Upon this as a basis, the Geological Survey can complete an accurate topographical map of the State, and such a map is necessary both for the elucidation and for the exhibition of the Geology of the State and for other purposes. But the progress of the Coast Survey is so slow on account of the smallness of the annual appropriation made by Congress that it will require a great many years to carry

out their plan. Perhaps the best thing would be for the State to aid in hastening the work by appropriating a sum of money to the use of the Coast Survey to be expended within the State. Similar appropriations have been made by other States (Massachusetts, New Hampshire, &c.,) with excellent results. The Board of Commissioners respectfully suggest this to the consideration of the Legislature.

Inasmuch as a report on the Fossil Botany of the State is being prepared, and we understand that a complete treatise on the existing Botany of Pennsylvania can be had for the use of the people of the State, provided the Board be authorized to publish it, the Board deems it advisable to ask authority to publish the latter treatise also as a part of the series.

By the sixth section of the "Act to provide for a Geological Survey of the State," it is made the duty of the Board to "cause to be collected such specimens as may be necessary to form a complete cabinet collection of specimens of the geology and mineral resources of the State." This duty has been well performed and the specimens are already accumulated on our hands to such an amount that we are embarrassed how to dispose of them. Some few specimens have been arranged in cases in the rooms of the Survey, at Harrisburg, but the great majority are still in boxes. A collection of specimens in boxes is not of the slightest use to any one. Unless steps are taken for their display in cases in a suitable room, the history of the collections of the former Survey will be repeated. The boxes will be first stored in some cellar or attic, then they will be lost sight of, and if twenty years hence inquiry is made about them, it will be found that they have disappeared. The proper time to arrange a cabinet is while the specimens are coming in; then knowledge on the subject is fresh; mistakes, always possible, can be easily rectified, missing specimens can be supplied, doubtful descriptions verified, and

the collection put in order with a tithe of the labor and expense which would be afterwards required.

Ultimately it will be necessary to erect a room for the cabinet of specimens, but for the present the Board would suggest that ample room for the purpose could be found in the State Library, and it suggests that an appropriation might be made for the erection of the necessary cases in that place.

In this connection we desire to bring to your attention the *display of a Cabinet at the Centennial Exhibition*. There would be considerable extra expense involved and the specimens required would be of a different class, being confined more to such as have a commercial value, as Ores and Coals. A collection exhibiting the metallurgical industries of our State should also be made. In itself it will be highly important and interesting, and indeed in the time remaining to do the work it may be the readiest means of quickly obtaining specimens of ores required. A good collection can be obtained for the opening of the Centennial Exhibition, to be afterwards perfected in any details left incomplete. All material admitted to a place in the Centennial Exhibition could afterwards find a place in the State Cabinet.

This Exhibition is not within the province of the Board of Geological Commissioners. They have no right to appropriate money to this object, even if they had any to appropriate. At the same time they feel so profoundly impressed with the importance of a creditable display of the mineral wealth of our State, the richest in the Union, that they earnestly unite in urging the Legislature to make an appropriation for that purpose at the earliest possible moment, and in the terms, substantially, of the Act recommended by the Board last winter.

To recapitulate:—

The Board asks for an additional appropriation of fifteen thousand (15,000) dollars to be expended in 1876.

They ask also for an appropriation for two years more, that is, an annual appropriation of fifty thousand (50,000) dollars for each of the years 1877 and 1878.

They suggest an appropriation of three thousand (3,000) dollars to be made for the use of the U. S. Coast Survey, to be expended in the State.

The Board also recommend an appropriation of ten thousand (10,000) dollars for the purpose of an Exhibition of Ores and Minerals at the Centennial Exhibition.

And they recommend a moderate appropriation for fitting up cases in some suitable room, accessible to the people, in which to exhibit for the present the geological specimens collected by the Survey; with a further recommendation that as soon as possible a room be erected for the permanent preservation and exhibition of the collection.

The above is respectfully submitted.

JOHN F. HARTRANFT,
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